Teachers' Perspectives on Integrating Modern Educational Technologies in Higher Education

A

SYNOPSIS

(THESIS PROPOSAL)

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IN

MANAGEMENT

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2022

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Candidate's Declaration

I, ***Ogirala Rama Seshagiri Rao***, declare that the synopsis entitled, "***Teachers' Perspectives on integrating modern Educational Technologies in Higher Education***" being submitted in the partial fulfillment of the requirement for the award of the degree of Doctor of Philosophy in Management under ICFAI Business School, The ICFAI University, Dehradun during the academic year 2022-23.

It is the work that is expected to carried out under the supervision of ***Dr. Puneet Kumar Gupta*** It is further declared that the synopsis is within the plagiarism limit and copy of the same is attached as per the University norms.

Signature **Date: 21.02.2022**

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CERTIFICATE

This is to certify that the thesis entitled, "***Teachers' Perspectives on integrating modern Educational Technologies in Higher Education***" is an original piece of work done by ***Ogirala Rama Seshagiri Rao*** under my supervision being submitted in the partial fulfillment of the requirement for the award of the degree of Doctor of Philosophy in Management under ICFAI Business School, The ICFAI University, Dehradun during the academic year 2022-23.

Further, it is It is certified that the synopsis is within the plagiarism limit and copy of the same is attached as per the University norms.

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Introduction

Just like in other sectors, information technology has been helping higher education sector to be more efficient in its operations by using educational technologies (also known as "EdTech"). Educational technologies refer to the IT-assisted technologies that are used for more effective academic delivery (teaching-learning-evaluation) by making the classes more interesting, more engaging /participative, more inclusive, facilitate personalized learning and higher order learning (Bloom's Taxonomy) and enable better educational outcomes. Some examples of innovative educational technologies are Artificial Intelligence, 3d printing, Virtual Reality, Augmented Reality, Gamification, Videos (Like You Tube), Video Games, Interactive whiteboards (like Google Jamboard), Online Collaboration Work Spaces (e.g., Microsoft Teams), Learning Management Systems (Moodle, Google Classroom, etc.), use of Mobile technology, Podcasting, Digital Readers , Tablets etc.

Indian EdTech market for 2020-21 was $800 million and is expected to scale up to $30 billion by 2030. Right now, India is home to 4 Unicorns (more than $1 billion market cap). EdTech vendors like Byjus ($16.5 B, Unacademy-$3.4B, Eruditus-$3.2B, UpGrad-$1.2 B), who have been growing online education services. This underlines the need for understanding the factors, influencing Educational Technology adoption by individual teachers, which is critical for the successful digital transformation of higher education.

While Educational Institutions have been deploying Educational Technologies for quite some time, COVID-19 pandemic accelerated its use. During the course of 2020, due to the unprecedented COVID-19 Pandemic situation, most of the Higher Education Institutions (HEIs) across the world had to switch over to educational technologies to conduct classes for the students, who has to learn remotely from their homes. While it is an undeniable fact that COVID-19 accelerated the pace of Technology Adoption in Higher Education World Wide, type of response as well as level of technology adoption varied widely, at institution level as well as at individual level, both teachers and students. Some institutions left the modus operandi for conduct of online classes to the discretion of individual teachers ,whereas some institutions deployed the same Educational Technologies for LMS and Video- conferencing platforms across the Institution. In some cases, teachers merely used video conferencing as a platform to teach and engage the students and make the learning more interesting and interactive.

However, a number of teachers ,particularly in Government Institutions and those in urban / rural areas faced challenges with regard to lack of availability of appropriate digital devices, affordable software, limited internet bandwidth, cyber security vulnerabilities and privacy issues.

Though some institutions have taken important steps towards the integration of education technologies into classrooms, the level of adoption and effectiveness of the same was varied. Acceptance and adoption of technology by the teachers is critical for the success of the adoption by the Institution. While current generation of students are tech savvy and adopt technology in day-to-day life more readily, it is not the case with the teachers. This study will help in in understanding the factors impacting adoption of Educational Technology by teachers in Higher Education Institutions (HEIs).

Literature Review – Approach

A Systematic Literature Review (SLR) was conducted to explore the influencing factors affecting adoption of technology in pedagogy by teachers. In phase-I, in which research articles were searched from 1990 onwards. After a broad review, 93 articles were found to be relevant, after reading the abstracts. Besides, a few back dated papers were also included. After phase-I, it was found that UTAUT is the latest technology adoption model on which relatively less research was conducted. A study of the evolution of Technology Acceptance Models showed that the first model (TAM) was formulated in 1986 and the last (UTAUT-2) was in 2012 , though some empirical studies deployed modified models depending on the context of the study . So, in phase-II of the study , a new search was conducted from 2012 to include ("UTAUT" OR "UTAUT-2" OR "Unified Theory of Acceptance and Use of technology") AND (("("Learning" OR "Education" OR "Faculty" OR "Teachers" OR "Students" OR "Institutions" OR "Colleges" OR "Universities"). It yielded 87 relevant articles, which were studied with respect to aspects, which included Geography (Country/Region) , Stakeholders (Students , Teachers, Management), Educational Technology of focus ,Type of teaching-learning system (Online, Blended /flipped learning etc), Courses taught , Sample size, Model deployed (UTAUT,UTAUT-2, modified etc, if modified version was used, what were the modifications?). The review also covered the Constructs , Moderating Variables, Method of analysis etc.

Shodh Ganga, the repository of PhD theses accepted in Indian Universities also searched using key words , technology, adoption, education . Two theses were found to be in the area of technology adoption in education . One of them was in the area of school education and the second is focused on ICT infrastructure in Indian Management education. Details of the 2 theses are presented in Annexure 4

Analysis of the papers studied

Analysis of papers studied is presented in Annexure1

49 out of the 87 papers (65%) were published in 2020 and 2021. Only 3 papers (about 4%) are from India.

Review of models for technology adoption for understanding adoption of modern educational technologies among teachers

Fishbein and Ajzen (1975) propounded the Theory of Reasonable Action, as per which "attitude" is the most important factor that determines behavioural intention a person. "Attitude" is defined as the individual's evaluation of an object. "Belief" is the link between an object and some attribute, and defined "behaviour" as a result or intention. Attitudes are affective in nature and are based upon a set of beliefs about the object of behaviour . They also depend on the person's subjective norms of the perception of the neighboring community's attitude to a specific behaviour.

Technology Acceptance Model (TAM) was introduced by Davis (1986) , as an adaptation of Theory of Reasonable Action. It was specifically adapted for modeling users' acceptance of Information Technologies (IT). The model hinged on two major factors, Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness (PU) is the potential user's subjective perception that the system will benefit the user's actions. Perceived Ease of Use (PEU) is the perception of the user on the efforts needed to use the system.

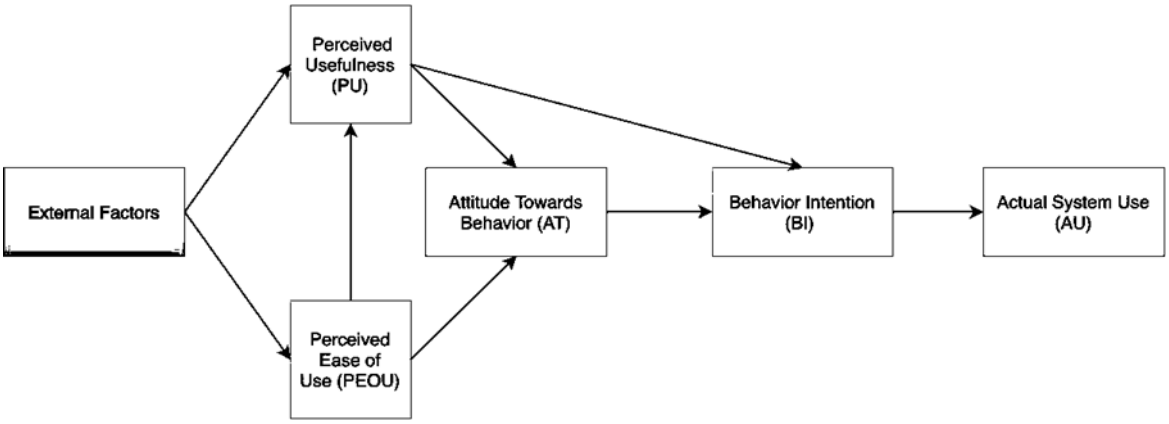


Figure 1 – Technology Acceptance Model-1 (Source: Davis. (1986)

Ajzen (1991) developed the Theory of Planned Behavior, which identified the major factors that determine the behavioural intention. The first two factors are the same as in Theory of Reasonable Action. The third factor is the Perceived Control Behaviour, which is perceived to limit their behavior.

Rogers (1995) proposed the theory of 'diffusion of innovation', which established the foundation for conducting research on innovation acceptance and adoption. His research was a synthesis of over 500 diffusion studies on adoption of innovations among individuals and organization. The theory explains the process through which an innovation is communicated over a period of time, among the members of a social system. The theory explained that the innovation and adoption occurred after going through multiple stages, which include understanding, persuasion, decision, implementation, and confirmation. It led to the development of S-shaped adoption curve of adopters, classified as innovators, early adopters, early majority, late majority and laggards.

Taylor and Todd (1995) introduced the Decomposed Theory of Planned Behaviour , which consists of three major influencing factors , which are attitude, subjective norms and perceived behavior control.

TAM-2

Venkatesh and Davis, (2000), for the first time, tested the enhanced version of Technology Acceptance Model, called TAM-2, using longitudinal data collected on four different systems at four different organizations , two of them involving voluntary usage and two studies , involving mandatory usage.

The model constructs were measured at three stages at each organization, which included pre-implementation, one month after implementation, and three months after implementation. The extended model was strongly supported for all four organizations at all three points of measurement. Both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influenced user acceptance. The results revealed that TAM 2 performed well in both voluntary and mandatory environment. These findings laid the foundation for further research on Technology Acceptance Models.

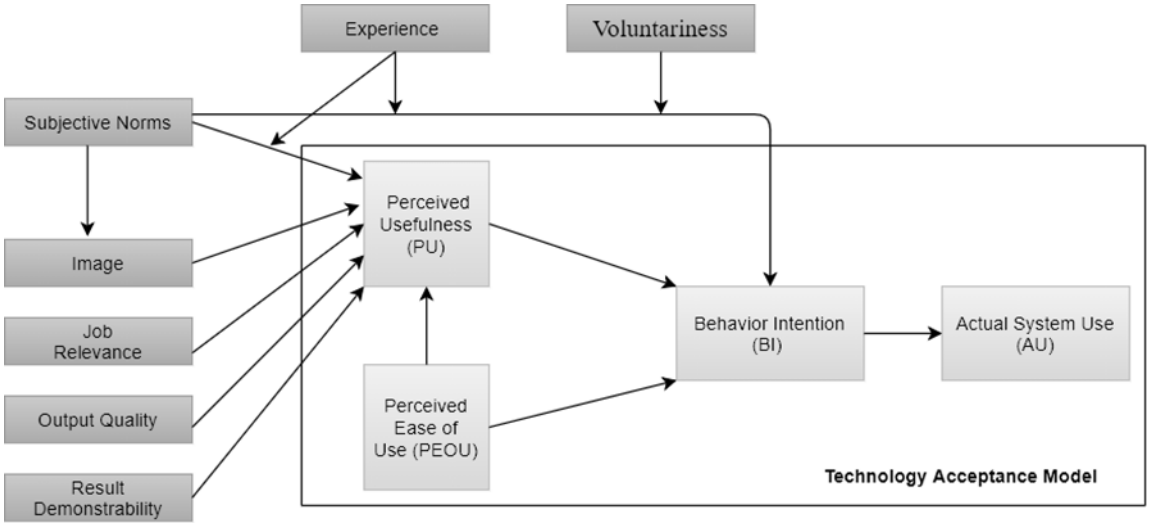


Figure 2- Technology Acceptance Model-2 (Source: Venkatesh and Davis (2000)

Unified Theory of Acceptance and Use of Technology (UTAUT)

After studying all the previous models and theories, Venkatesh et al (2003) formulated Unified Theory of Acceptance and Use of Technology (UTAUT). As per the new model, four predictors of users' behavioural intention are performance expectancy, effort expectancy, social influence and facilitating conditions. Performance Expectancy includes the five constructs of perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations, whereas effort expectancy includes the factors of perceived ease of use and complexity. It was found from the validation tests that Social Influence was not significant in voluntary contexts.

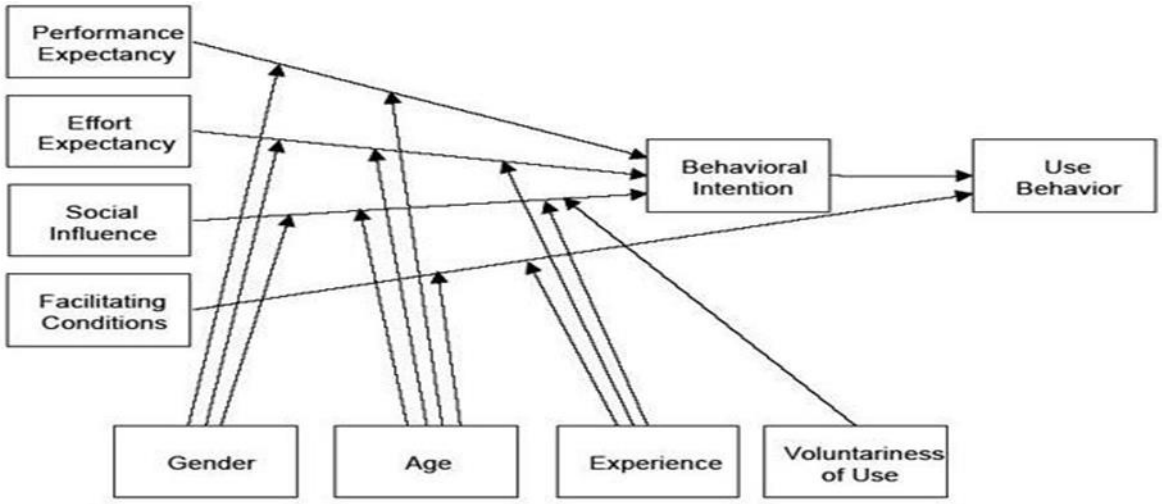


Figure 3. UTAUT Model (Venkatesh, Morris, Davis & Davis, 2003)

TAM-3

Combining TAM 2 Model and the model of the determinants of perceived ease of use, Venkatesh and Bala (2008) developed an Integrated Model of Technology Acceptance, named TAM 3, which factored the determinants of perceived usefulness and perceived ease of use, individual differences, system characteristics, social influence, and facilitating conditions . In TAM 3 research model, the perceived ease of use to perceived usefulness, computer anxiety to perceived ease of use and perceived ease of use to behavioural intention were moderated by self-experience. This model was tested in real-life cases of a number of IT implementation projects.

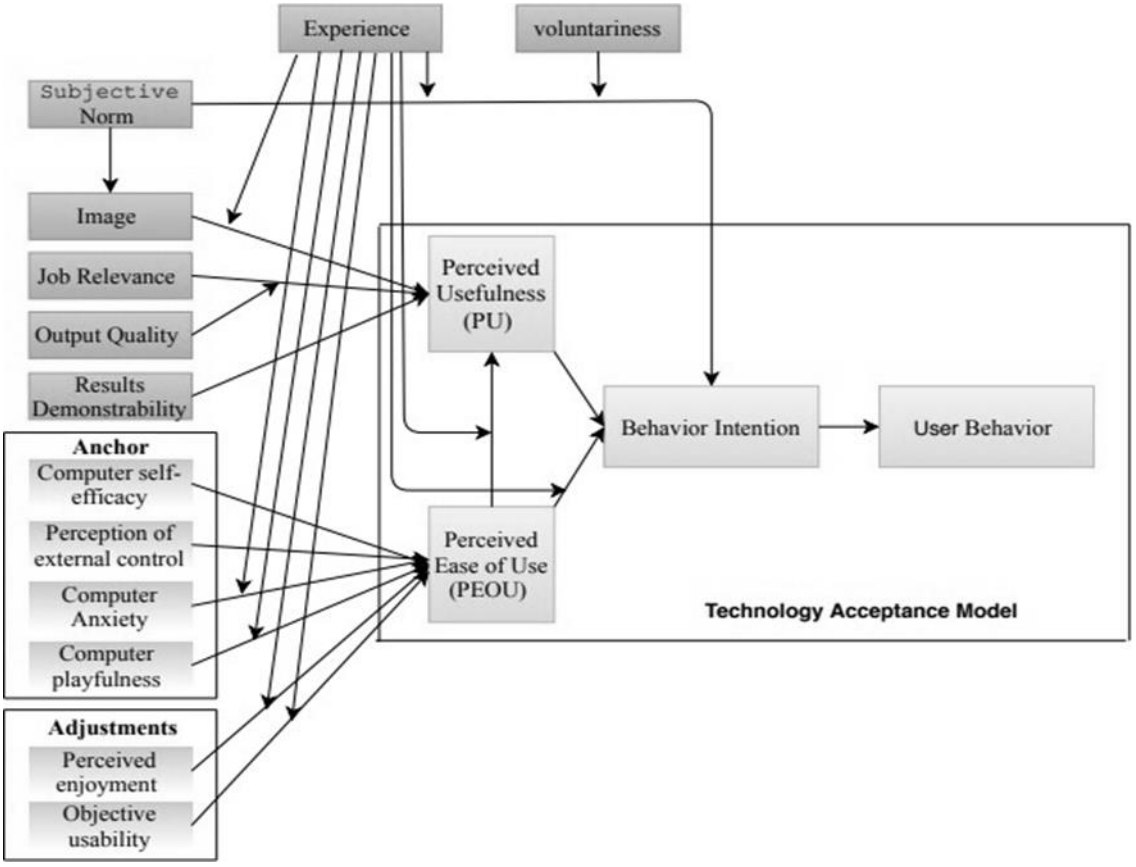
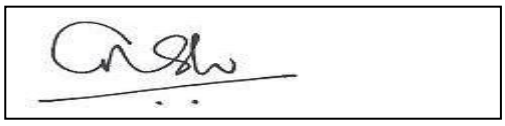


Figure 4 : Technology Acceptance Model -3 Source: Venkatesh, V. and Bala, H. (2008)

UTAUT-2

Further studies culminated in the emergence of UTAUT2, incorporating three additional variables, habits, hedonic motivation, price value and users' characteristics: age, gender and experiences as moderator variables to influence their effects between the independent variables and the behaviour intention and utilization of ICTs as in Figure 2 (Venkatesh et al., 2012). The model of UTAUT 2 , which is an extended version of UTAUT, yielded a significant improvement in both the variance that could be explained in behavioural intention (56% to 74%) and use of technology (40% to 52%).



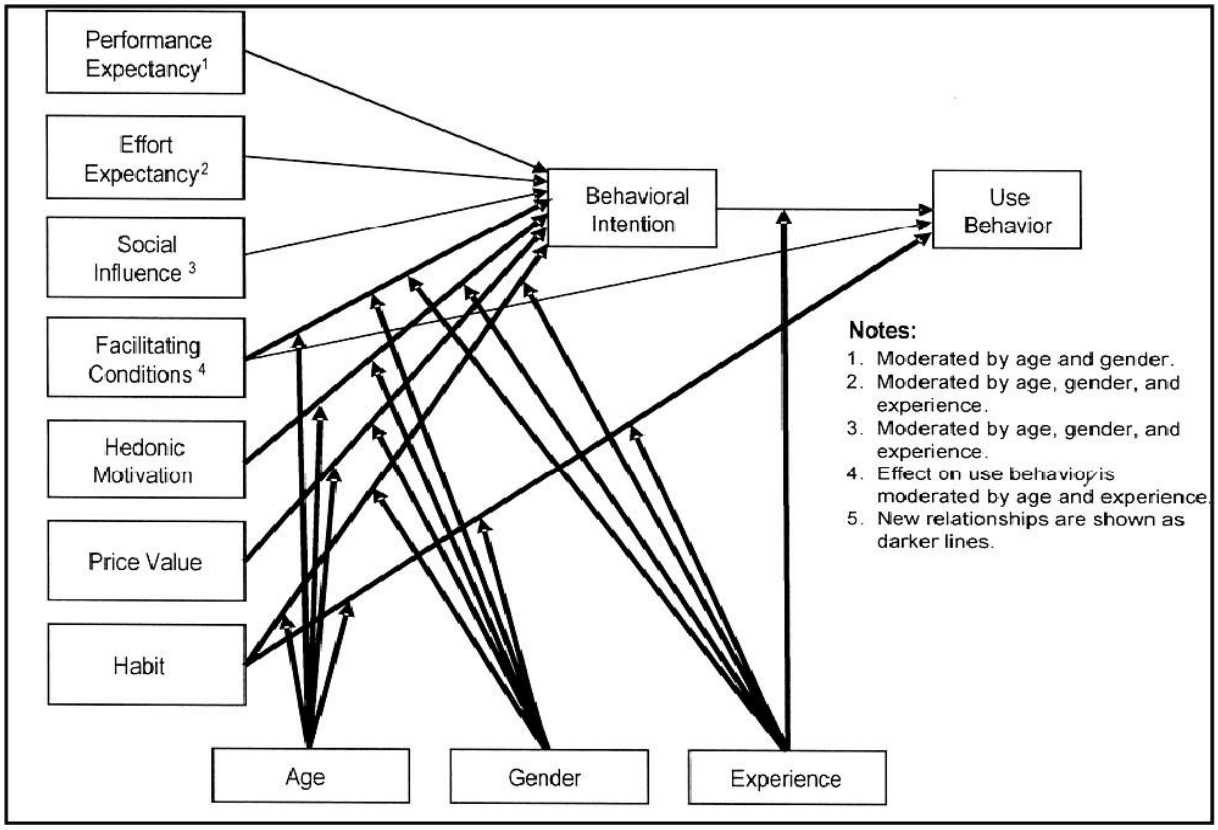


Figure 5- Technology Acceptance Model – UTAUT2 - Source: Venkatesh et al (2012).

Summary of Evolution of the Theories/Models of Technology Adoption/Acceptance

S. No	Theory/Model	Author(s)	Year	Constructs/ Salient aspects	Remarks
1	Theory of Reasoned Action	Fishbein and Ajzen	1975	Attitude, Subjective Norms	
2	Technology Acceptance Model (TAM-1)	Davis	1986	Perceived Usefulness, Perceived Ease of Use	
3	Theory of Planned Behaviour	Ajzen	1991	Attitude, Subjective Norms, Perceived Control Behaviour	
4	Theory of Diffusion of Innovation	Rogers	1995	Stages of adoption of Innovation, S- shaped Adoption Curve	5 categories of adopters- Innovators, early adopters, early majority, late majority and laggards .
5	TAM-2	Venkatesh and Davis	2000	Cognitive Influence, Social Influence	Tested in 4 longitudinal studies (Voluntary and Mandatory environments)

6	Unified Theory of Acceptance and Use of Technology(UTAUT)	Venkatesh, Morris and Davis & Davis	2003	Performance Expectancy, Effort Expectancy, Social Influence, Facilitative Conditions	
7	TAM-3	Venkatesh and Bala	2008	Perceived Usefulness, Perceived Ease of Use, Computer Anxiety, Self-Experience	Tested in IT implementation projects
8	UTAUT-2	Venkatesh, Thong and Xu	2012	3 variables added to UTAUT (Habits, Hedonic motivation, Price value). Users' characteristics (age, gender and experience, voluntariness) added as moderating variables.	Behavioural Intention and Use of Technology could be explained more significantly.

Table-1 Summary of Evolution of the Theories/Models of Technology Adoption/Acceptance

Source : Author's Analysis

Review of factors influencing teachers in adopting modern educational technologies in HEIs -Empirical Studies conducted before COVID-19 (before 2020)

Barriers for adoption of technologies by institutions

As per Bates & Epper (2001), the barriers that prevent Institutions from establishing an environment that allows teachers to take advantage of technology resources, are appropriate planning and budgeting for instructional technology, organizational structures and communication and faculty rewards and incentives.

Abrahams (2010) proposed a framework, combining the empirical data from research using concept mapping with the theoretical factors identified from the literature, which identifies the priority issues and barriers to technology adoption. He suggests that a higher education institution, in its early adoption phase of using instructional technology, must address the issues of reaching the critical mass, so that the majority of the teachers can see the benefits of using instructional technology in the classroom. Major barriers identified by the study include perception, resistance to change, technological support, financial support, infrastructure, knowledge/information and technophobia.

Studies based on individual characteristics of the teachers

John (2015) developed a conceptual model to identify the critical success factors for technology adoption among faculties of tertiary educational institutions. A study of 261 full time faculty members in Asian Region (Thailand, India, Vietnam and Indonesia) showed that age, gender, self-efficacy, prior computer experience shaped the attitude to adopt technology. Compatibility, computer self-efficacy and prior computer experience are the strongest antecedents of attitude to use technology. As per the study, male lecturers were found to have more positive attitude.

Sharma and Srivastava (2019) studied 235 teachers employed in the Management Institutes in Bengaluru, Pune, Indore and Delhi. The results of the study confirm a significant positive impact of Value Beliefs (VB), Social Influence (SI) and Perceived Ease of Use (PEOU) on the Behavioural Intention (BI) to use technology by the teachers. However, the study does not establish the relationship between Self-Efficacy and BI to use technology by teacher

Technology Acceptance Levels

Eylem and Emel (2017) examined the technology acceptance level of teachers at Anadolu University School of Foreign Languages, Turkey to test the UTAUT that determines the variables influencing individuals' technology acceptance. The respondents were 44 lecturers who were using technology for teaching foreign languages. The findings reveal that the overall technology acceptance level of participants was average. Support of the University was found to be an important factor for adoption. The University ensured that technology was incorporated in almost all the lessons and language lab, and students get good support from their teachers. This has resulted in the high level of technology acceptance.

Academic Delivery Models

Handoko (2019) studied respondents consisting of 365 students from various online learning study programs at Indonesia Open University, using UTAUT. As per the study, performance expectancy, effort expectancy, quality of service, and personal innovativeness affected the behavioural intention, while the influence of the teacher had no effect on behavioural intention, possibly because online programs, students do not frequently meet the teacher. Besides, facilitating condition had no effect on
use behaviour, as online program students use their own computing facilities from home or work place, to access the course.

Technology Tools

Alharbi and Drew (2014) used modified version of Technology Acceptance Model in an attempt to predict the behavioural intention to use Learning Management Systems (LMS) in the Universities in Saudi Arabia. This study proposed a theoretical framework, which includes the basic constructs of TAM, Perceived Ease of Use, Perceived Usefulness and Attitude toward usage. Additional external variables that were adopted were lack of LMS availability, prior LMS usage experience and job relevance.

Dumpit and Fernandez (2017) studied the drivers of social media in Higher Education Institutions (HEIs) in an emerging economy. Data from 500 students from public and private HEIs in the Philippines were collected and analysed using core constructs of TAM besides, subjective norm, perceived playfulness, internet reliability and speed as additional constructs. it was found that internet reliability and speed were significant only in some public HEIs. This finding may due to the fact that Information and Communications Technology (ICT) Infrastructure in Public HEIs may not be a priority investment in most of the developing countries.

Facilitating Factors

Eylem and Emel (2017) examined the technology acceptance level of teachers at Anadolu University School of Foreign Languages, Turkey to test the UTAUT that determines the variables influencing individuals' technology acceptance. The respondents were 44 lecturers who were using technology for teaching foreign languages. The findings reveal that the overall technology acceptance level of participants was average. Support of the University was found to be an important factor for adoption. The University ensured that technology was incorporated in almost all the lessons and language lab, and students get good support from their teachers. This has resulted in the high level of technology acceptance.

Mediating Variables

John (2015) developed a conceptual model to identify the critical success factors for technology adoption among faculties of tertiary educational institutions. A study of 261 full time faculty members in Asian Region (Thailand, India, Vietnam and Indonesia) showed that age, gender, self-efficacy, prior computer experience shaped the attitude to adopt technology. Compatibility, computer self-efficacy and prior computer experience are the strongest antecedents of attitude to use technology. As per the study, male lecturers were found to have more positive attitude.

Research done during COVID-19 Period (2020 and 2021)

Alqahtani and Rajkhan (2020) identified the critical success factors for E-learning during COVID-19 using the multi-criteria Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) techniques to enhance the educational process. It was found that technology management, support from management, increased student awareness to use E-learning systems, and demanding a high level of Information Technology from instructors, students and Universities were the most influential factors for E-learning during COVID-19. Among the five learning systems, blended learning was the most suitable learning system to practice. These results demonstrated that, regardless of how extraordinary the technology is, in an educational institution, readiness of the institution for E-learning execution played a more important role in enhancing the educational delivery process during COVID-19 situation.

As per a study by International Finance Corporation (IFC)(2020) , in the education sector, a number of educational technology companies provided free access to their services for a limited period , or repurposed their platforms to train workers in the most in-demand skills. Global MOOC platforms like Coursera and EdX made available a number of courses available to students for free, though for limited periods ,with certain caveats. In India, Byju's, a learning app for grades K–12, saw a steep 60 percent increase in the number of new users during COVID-19 period. In China, Zhangmen, an online one-on-one tutoring service provider for K–12 students, achieved over 100% growth in early 2020, compared with the same period in 2019. Edudesk, an online education platform in Africa, provided free access to students across the country. Up-skilling companies like Andela and Gebeya in Africa and Revelo in Latin America changing their business models to offer training in the most in-demand skills.

Al-Maroof et al. (2020) analyzed the effect of fear emotion on students' and teachers' technology adoption during COVID-19 pandemic. The study covered the use of Google Meet as an Educational Technology platform in private higher education institutes. During the Coronavirus Pandemic, fear due to family lockdown situation, fear of education failure and fear of losing social relationships were found to be the most common types of threats that are faced by the students and teachers/educators. These fears are connected with two important factors in TAM Model, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), and Subjective Norm (SN).

Raza1(2020) used UTAUT to investigate the influence of Social Isolation, and the moderating role of COVID-19 fear on behavioral intention of the Learning Management System and its Use Behavior of Learning Management System among students. The findings showed a positive link of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Social Isolation on Behavioral Intention to use LMS and its use behavior. Moreover, the results of the moderation analysis showed that COVID-19 fears only moderated the link of performance expectancy and social influence with behavioral intention of LMS. The findings underline the need for improving the student experience of LMS to enhance the Behavioral Intention.

Research gaps identified

As can be seen from Annexure-1:

- Most of the studies in Asia-Pacific (Singapore, Malaysia, Thailand, Indonesia), Very few (3%) from India
- Most of the studies (76%) covered students as stakeholders , only 24% covered teachers as stakeholders
- Most of the research conducted so far has been focused on the contextual constructs. Learning Outcomes were not covered
- Level of Technology Adoption was not studied in most of the studies.
- Level of use was not covered in most of the studies

- In order to adopt and deploy Technologies successfully in Institutions, Leadership and Organisation structure play an important role. Type of management (Private or Government) was not included in most of the studies.
- Size of the Institution affects the deployment as larger institutions can build adequate IT infrastructure and create facilitative environment. However most of the studies did not consider it as a mediating variable
- Most of the research (97%) conducted so far was mostly in self-learning settings like e-learning, m-learning from students' perspectives and face to face learning from Teachers' perspective. In campus programs, Blended Learning model has come to stay , due to COVID-19 and hence more research may be needed in that area.
- Most of the studies have been cross sectional studies and hence longitudinal studies can help in understanding the impact of Pedagogical and Organisational Interventions on Behavioural Intentions as well as Use of Technology.
- Discipline of study, Courses and quality of content were not included in most of the studies
- COVID-19 times exposed the Infrastructural constraints on availability of internet ,bandwidth, cost and also digital divide due to non-availability of Digital devices with the students in rural / urban areas
- Constructs – Attitude / Values of the teachers , which is critical for technology adoption, was covered in very few studies

Research gaps proposed to be covered

Based on the background of the research problem and literature review, this study aims to fill the following research gaps:

- Focus on Teachers , as stakeholders
- The study will focus on campus education environment , where technology is used to supplement / complement classroom education , which is called Blended Learning
- Level of technology adoption and level of usage will be covered as Dependent Variables
- Attitude / Value beliefs will be included as one of the constructs
- Type of institution (Govt or Private) and size of the institution (in terms of number of teachers in the Institution) will be included as mediating variables

Research Objectives

- To study impact of factors influencing adoption of modern educational technologies on behavioral intention of teachers in higher education
- To identify the impact of behavioral intention on actual usage of educational technologies by teachers in higher education
- To study the moderating effect of Type of institution, Size of institution and Age on the relationship between factors influencing adoption of educational technologies and behavioral intention
- To develop a comprehensive model of factors that influence the adoption of modern educational technologies by the teachers of higher institutions

Scope of the study

The study will cover adoption /integration of educational technologies in academic delivery ,which includes teaching-learning and evaluation . Educational Technologies refer to the IT-assisted technologies that are used for more effective academic delivery (teaching-learning-evaluation) by making the classes more interesting, more engaging /participative, more inclusive, facilitate personalized learning and enable better educational outcomes.

Conceptual Framework

Model

On analysis of the various models on technology adoption , it is proposed to use Modified UTAUT-2 model, due to following reasons:

- It was evolved over 35 years of journey of Technology Adoption Models , which started in 1986, incorporating the findings of empirical studies conducted using successive models
- The model of UTAUT 2 , formulated in 2012, as an extended version of UTAUT, was validated using longitudinal studies and yielded a significant improvement in both the variance that could be explained in behavioural intention (56% to 74%) and use of technology (40% to 52%).
- As per Wang (2022), it is the most validated model for technology adoption and is deployed in multiple sectors and different settings. He added that contemporary research is focused on sectoral modifications to the model

Constructs :

Dependent variables are Behavioural Intention and Use behaviour

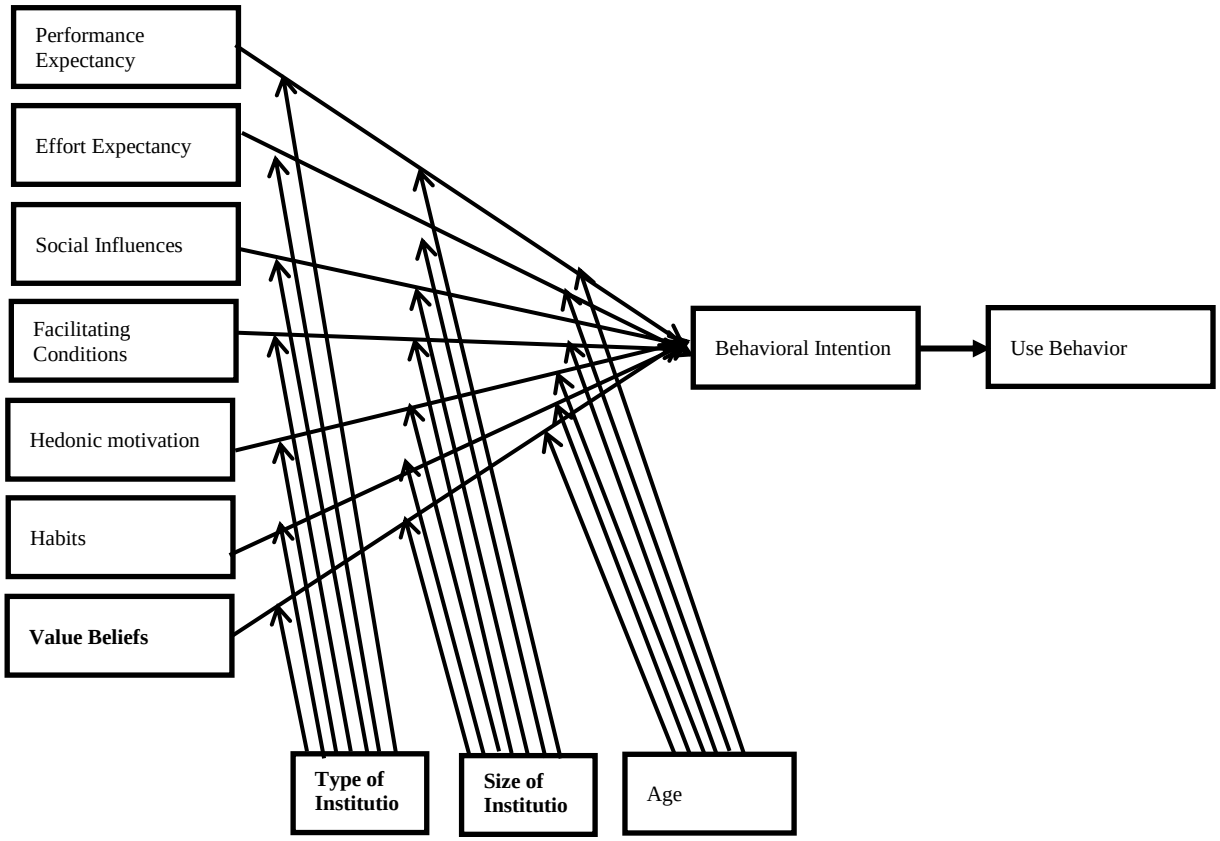
Independent variables - Seven Constructs are proposed to be used , which includes six from the original UTAUT-2 model (Venkatesh et all , 2012) , excluding Price Value, which is not relevant in in educational institutions, unlike in a consumer setting as it is the responsibility of the institution to provide the Educational Technology and neither teachers nor students pay for using the same . One construct , Value Beliefs, is proposed to be added , as it was found to be an important factor for technology adoption by teachers in India , as per the study by Sharma and Srivastava (2019) Exogenous factors will also be dealt with diligence , while selecting the main .factors, sub-factors and moderating factors

Definitions of Constructs

- Performance Expectancy (PE): "The degree to which an individual believes that using the system will help him or her to attain gains in performance."
- Effort Expectancy (EE)-"The degree of ease associated with the use of the system"
- Social Influence (SI) "The degree to which an individual perceived that important others believe he or she should use the new system"
- Facilitating Condition (FC) "The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."
- Habits(HB)- "Extent to which people tend to perform behaviours automatically because of learning"
- Hedonic Motivation (HM) – "Fun or pleasure derived from using a technology"
- Value Beliefs (VB) – "The perception and belief that the task is significant for the achievement of the goals"

- While the first four Constructs (PE,EE,SI and FC) cover Extrinsic Motivation , balance three (HB , HM and VB) focus on intrinsic motivation
- Moderating variables ,proposed :
  - Age (Upto 30,31-40,41-50,51-60, over 60) - As per the original UTAUT-2 model
  - Type of management of the HEI (Private / Govt) – New variable
  - Size of the Institution –(Small –upto 50 teachers/ Big- more than 50 teachers) -New Variable (Eylem and Emel (2017)
  - The moderating effect of academic discipline will be explored.

- Dependent Variables
    - Behavioural Intention (BI)- “Likelihood of a person to use technology”
    - Use Behaviour (UB)- “Actual Use of technology”
        - Levels of adoption ; Level-1 (Aware / Learning), Level-2 (Deploying / Experimenting with new technologies), Level-3 (Training/ Facilitating other teachers)
        - Level of use : Average (upto 30% of the class), Good (31-60%), Excellent (More than 60% of classes)



The following section explains the hypothesis testing for direct and indirect effects:

Direct effects

To examine the influence of various factors considered in the research model on behavioral intention on the adoption of modern educational technologies, following hypotheses are proposed:

H1a0: Performance expectancy has no significant influence behavioral intention on adoption of modern educational technologies
H1a1: Performance expectancy has a significant influence on behavioral intention on adoption of modern educational technologies

H1b0: Effort expectancy has no significant influence on behavioral intention on adoption of modern educational technologies
H1b1: Effort expectancy has a significant influence on behavioral intention on adoption of modern educational technologies
H1c0: Social influence has no significant influence on behavioral intention on adoption of modern educational technologies
H1c1: Social influence has a significant influence on behavioral intention on adoption of modern educational technologies
H1d0: Facilitating conditions has no significant influence on behavioral intention on adoption of modern educational technologies
H1d1: Facilitating conditions has a significant influence on behavioral intention on adoption of modern educational technologies
H1e0: Habits has no significant influence on behavioral intention on adoption of modern educational technologies
H1e1: Habits has a significant influence on behavioral intention on adoption of modern educational technologies
H1f0: Hedonic motivation has no significant influence on behavioral intention on adoption of modern educational technologies
H1e1: Hedonic motivation has a significant influence on behavioral intention on adoption of modern educational technologies

To test the influence of behavioral intention on actual usage of modern educational technologies, following hypotheses is proposed:

H2a0: Behavioral intention has no significant influence on actual usage of modern educational technologies
H2a1: Behavioral intention has significant influence on actual usage of modern educational technologies

Moderating effects

To test the moderating effects of Age , Size of institution and Type of institution on the significant relationships between the factors influencing adoption of modern educational technologies and behavioral intention, following hypotheses were framed:

Age

H3a0: Age has no significant moderating effect on the relationship between Performance expectancy and behavioral intention
H3a1: Age has significant moderating effect on the relationship between Performance expectancy and behavioral intention
H3b0:Age has no significant moderating effect on the relationship between effort expectancy and behavioral intention
H3b1: Age has significant moderating effect on the relationship between effort expectancy and behavioral intention
H3c0: Age has no significant moderating effect on the relationship between social influence and behavioral intention

H3c1: Age has significant moderating effect on the relationship between social influence and behavioral intention

H3d0: Age knowledge has no significant moderating effect on the relationship between facilitating conditions and behavioral intention
H3d1: Age knowledge has significant moderating effect on the relationship between facilitating conditions and behavioral intention
H3e0: Age has no significant moderating effect on the relationship between habits and behavioral intention
H3e1: Age has significant moderating effect on the relationship between habits and behavioral intention
H3f0: Age has no significant moderating effect on the relationship between hedonic motivation and behavioral intention
H3f1:Age has significant moderating effect on the relationship between hedonic motivation and behavioral intention

Type of institution

H4a0: Type of institution of employees has no significant moderating effect on the relationship between Performance expectancy and behavioral intention
H4a1: Type of institution has significant moderating effect on the relationship between Performance expectancy and behavioral intention
H4b0: Type of institution has no significant moderating effect on the relationship between Effort expectancy and behavioral intention
H4b1: Type of institution has significant moderating effect on the relationship between effort expectancy and behavioral intention
H4c0: Type of institution has no significant moderating effect on the relationship between social influence and behavioral intention
H4c1: Type of institution has significant moderating effect on the relationship between social influence and behavioral intention
H4d0: Type of institution has no significant moderating effect on the relationship between facilitating conditions and behavioral intention
H4d1: Type of institution has significant moderating effect on the relationship between facilitating conditions and behavioral intention
H4e0: Type of institution has no significant moderating effect on the relationship between habits and behavioral intention
H4e1: Type of institution has significant moderating effect on the relationship between habits and behavioral intention
H4f0: Type of institution has no significant moderating effect on the relationship between hedonic motivation and behavioral intention
H4f1: Type of institution has significant moderating effect on the relationship between hedonic motivation and behavioral intention

Size of institution

H4a0: Size of institution of employees has no significant moderating effect on the relationship between Performance expectancy and behavioral intention
H4a1: Size of institution has significant moderating effect on the relationship between Performance expectancy and behavioral intention
H4b0: Size of institution has no significant moderating effect on the relationship between Effort expectancy and behavioral intention
H4b1: Size of institution has significant moderating effect on the relationship between effort expectancy and behavioral intention
H4c0: Size of institution has no significant moderating effect on the relationship between social influence and behavioral intention
H4c1: Size of institution has significant moderating effect on the relationship between social influence and behavioral intention
H4d0: Size of institution has no significant moderating effect on the relationship between facilitating conditions and behavioral intention
H4d1: Size of institution has significant moderating effect on the relationship between facilitating conditions and behavioral intention
H4e0: Size of institution has no significant moderating effect on the relationship between habits and behavioral intention
H4e1: Size of institution has significant moderating effect on the relationship between habits and behavioral intention
H4f0: Size of institution has no significant moderating effect on the relationship between hedonic motivation and behavioral intention
H4f1: Size of institution has significant moderating effect on the relationship between hedonic motivation and behavioral intention

Research Methodology

Exploratory and descriptive research designs will be used in this study. Literature review and focus group discussion methods of exploratory research design will be employed to identify the pool of items for teacher adoption. Hypotheses will be developed to test relationships among the variables of interest to achieve the objectives of the study. The survey method of descriptive research design will be used to obtain the primary data regarding the employee's perceptions of adopting e-government and job performance. Both primary and secondary data will be used to collect information.

Survey location and Target respondents

- The study will be carried out in Jharkhand state in India. Reasons for selecting the state are low Gross Enrollment Ratio (20.9% as per AISHE 2019-20 report) , huge gap in GER between metros and urban areas and purchasing power

- Sampling Frame: Teachers only from Universities /Constituent colleges in Jharkhand will be covered. List of Universities and population of teachers are given in Annexure-2.

- Sampling Method – Appropriate statistical sampling method will be deployed to cover the defined sampling frame adequately. Sample size for the survey will be calculated, as per the established statistical methods . Respondents for the survey will be selected as per statistical methods.
- **Data collection**

  A self-administered standardized questionnaire will be used for primary data collection as a survey instrument. **The questionnaire for the survey will be adapted from well-established scales from the literature review. After conducting a pilot study, the questionnaire will be reviewed and fine tuned before administering the same to the balance target respondents.**

Proposed Statistical Tools for analysis

Descriptive statistics will be used to explain the basic characteristics of the data collected. The study will use parametric tests to test the hypothesized relationships, assuming the distribution of the population as normal. Statistical tools like Multiple Regression Analysis and Structural equation Modeling will be used to analyze structural relationships between measured variables and latent constructs. Tools like Interpretative phenomena analysis techniques will be used to analyze the data collected from interviews of teachers.

Expected contribution of the study

Research oriented significance

This study endeavours to cover the following research gaps that were identified during the Literature Review:

- Level of Technology Adoption ,which was not studied in most of the studies.
- Type of the Institution (Private or Government), which influences type of leadership and Organisation structure ,which play an important role in facilitating and motivating the teachers. .
- Size of the Institution
- Blended Learning environment ,which is the largest prevailing set-up in most of the Higher Educational Institutions in India. Empirical research conducted so far was mostly in self-learning settings like e-learning, m-learning from students' perspectives and face to face learning from Teachers' perspective. .
- This research will provide a comprehensive model for teachers' adoption of educational technology in Higher Education in India ,which could be extended to other developing countries

Practical oriented significance

This research will help the Management of the Higher Educational Institutions to identify the critical factors so that they can plan and implement successful deployment of modern educational technologies in Higher Education in blended mode by teachers. It will help in improving the quality of education, particularly in the context of COVID-19 pandemic, which has a prolonged effect on conduct of face-to-face classes . It will help decision makers in regulators like Ministry of Education to implement NEP-2020,wherein deployment of technology in the pedagogy is an important driver of quality education , It will also help the EdTech vendors to design, develop and facilitate Educational Technology Solutions in Higher Educational Institutions so as to improve educational outcomes.

Work Plan

Proposed work plan is presented in Annexure 3

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Annexure-1

Analysis of articles studied

Year	**No**	Remarks
2012	1	
2013	1	
2014	1	
2015	2	
2016	2	
2017	9	
2018	5	
2019	17	
2020	26	
2021	23	Upto Aug 2021
Total	**87**	

Region wise break-up			
Region	**No**	%	Remarks
Africa	7	8%	
Americas	7	8%	
Asia-Pacific	41	47%	Excluding India
India	3	3%	
Europe	12	14%	
Middle-East	17	20%	
Total	87	100%	

- Most of the studies in Asia-Pacific (Singapore, Malaysia, Thailand, Indonesia)
- Very few (3%) from India

Learning System wise break-up

Learning system	**No**	**%**	**Remarks**
Self Learning	84	97%	Online.Mobile
Blended	3	3%	UK,China,New Zeland
Total	87	100%	

- Most of the studies are on self-learning mode

Stakeholder wise break-up		
Stakeholders	No	%
Students	66	76%
Teachers	21	24%
Total	87	100%

- Most of the studies covered students as stake holders

Model wise analysis

Model	**Nos**	%	Remarks
TAM-1,TAM-2,UTAUT	66	76%	
TAM, UTAUT Modified	7	16%	Anxiety, Attitude, Course design, Course Content, Gamification, Instructor characteristics, Tech Support, Personal Innovativeness, Social isolation
UTAUT-2	14	8%	
Total	**87**	**100%**	

- Very few studies deployed UTAUT-2

Constructs studies and significance thereof – UTAUT studies in 2020 and 2021

Model	**Constructs**	**Studied**	**Significant**	**%**	**Remarks**
UTAUT	Performance Expectancy	32	32	100%	Significant
	Effort Expectancy	32	29	91%	Significant
	Social Influence	32	28	88%	Significant
	Facilitating Conditions	32	25	78%	Significant
UTAUT2	Hedonic Motivation	7	7	100%	Significant
	Habits	7	7	100%	Significant
	Price Value	2	0	0%	Not significant
Modified	Attitude	3	3	100%	1 in Indian context
	Personal Innovation in IT	2	2	100%	
	User trust	1	1	100%	
	Anxiety	1	1	100%	
	Course design	1	1	100%	
	Tech support	1	1	100%	
	Social isolation	1	1	100%	

Moderating variables				
Gender	32	32	100%	
Age	32	32	100%	
Voluntariness	7	1	not significant	

- Impact of Price-Value not significant
- In one of the studies in India, Attitude/Values was found to have significant influence

Annexure-2

Sampling Frame

Universities in Jharkhand

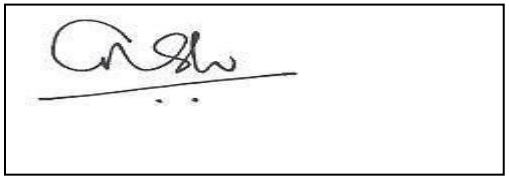
S No	University	Type	Disciplines
1	Central University of Jharkhand	Central Govt	Multi
2	IIT (Formerly Indian School of Mines)	Central Govt	Multi
3	National Institute of Technology, Jamshedpur	Central Govt	Multi
4	National University of Study and Research in Law	Central Govt	Single
5	Arka Jain University	Private	Multi
6	Birla Institute of Technology	Private	Multi
7	ICFAI University, Jharkhand	Private	Multi
8	Jharkhand Rai University	Private	Multi
9	Pragyan International University	Private	Multi
10	Sai Nath University	Private	Multi
11	Sarala Birla University	Private	Multi
12	Usha Martin University	Private	Multi
13	YBN University	Private	Multi
14	Binod Bihari Mahto Koyalanchal University	State Govt	Multi
15	Birsa Agricultural University	State Govt	Single
16	Jharkhand Raksha Shakti University	State Govt	Single
17	Kolhan University	State Govt	Multi
18	Nilamber-Pitamber University	State Govt	Multi
19	Ranchi University	State Govt	Multi
20	Sido Kanhu Murmu University	State Govt	Multi
21	Vinoba Bhave University	State Govt	Multi

Number of college teachers in Jharkhand

	Designation/Role	Universities and Constituent colleges		
		Male	Female	Total
1	Professors	446	95	541
2	Associate Professors	526	185	711
3	Asst professors/Lecturers	1239	487	1726
	Total	**2211**	**767**	**2978**

Month-wise plan of work and milestones to be achieved Annexure 3

S. No.	ACTIVITIES	MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	
1	Literature review for identifying the factors and sub-factors influencing adoption of modern educational technologies by teachers in higher education														
2	Questionnaire designing														
3	Pilot testing and refinement of questionnaire														
4	Final questionnaire distribution														
5	Data collection														
6	Data collection														
7	Data preparation														
8	Data analysis														
9	Thesis Report writing.Chapter1: Introduction; Chapter 2: Literature review and Conceptual framework; Chapter 3: Research Methodology														
10	Thesis Report writing: Chapter 4: Data Analysis and Interpretation; Chapter 5: Data Analysis and Interpretation														
11	Thesis Report writing:Chapter 6: Conclusions and Recommendations; Chapter 7: Limitations and Suggestions for further research														
12	Proofreading of the thesis and final submission														



	Topic	Scholar	University	Date of	Sampling frame	Objectives	Model deployed	Conclusions
1	A study on information and communication technology integration in indian management education	Pillai Anita Radhakrishnan	Anna Univ	Jan-20	100 Teachers and 821 Students across B Schools in Metr and Urban locations	To study perception of factors that contribute to effective technology adoption and service quality leading to satisfaction and better learning outcomes are examined to ensure successful technology adoption in management education. ICT Infrastructure (Desk Top computers,WiFi, Digital Library availability in Management educations, evaluates its service quality and underlines how these technologies impact learning outcomes and satisfaction	E-S-QUAL (Electronics Service Quality) scale consists of efficiency which is the ease, simplicity and speed of accessing services. It is a model for assessimg Service quality - measuring expectation of customer and quality perception . 22 parameters in 4 categories- System availability,Efficiency,Fulfillment and Privacy	Both students and faculty members identified similar challenges in the adoption of ICT in Management Education. Lack of infrastructure, proper training and support are some of the major challenges faced by the students. Non-availability of technical tools and lack of adequate online quality course contents are identified as the other challenges.
2	Modeling diffusion of ICT as an innovation among inter influencing potential adopters in an educational system	Raghu Raman R	Amrita Vishwa Vidyapeetham (University)	Aug-14	Teachers and students in schools	To explore the dynamics of ICT adoption by potential-adopter teachers and students in the context of Schools	No specific model	teacher's training program emerged as the dominant factor influencing innovation adoption .Relative Advantage, Ease of Use, Perceived Enjoyment and Department Support are other dominant factors to adopt ICT innovation by teachers and students